

AMENDMENT  
(under Article 34)  
(Translation)

To : Examiner of the Patent Office

1 Identification of the International Application  
PCT/JP2005/004443

2 Applicant

Name : Matsushita Electric Industrial Co., Ltd.

Address : 1006, Oaza-Kadoma, Kadoma-shi, Osaka,  
571-8501 JAPAN

Country of nationality : Japan

Country of residence : Japan

3 Agent

Name : (7243) Patent Attorney, ISHII Kazuo (seal)

Address : Kitahama-Yamamoto Building, 3-6,  
Kitahama 2-chome, Chuo-ku, Osaka-shi,  
Osaka 541-0041 Japan

4 Item to be Amended Specification and claims

5 Subject Matter of Amendment

(1) At page 5, lines 20 to 26 of the specification, "In the lithium secondary battery, it is preferred that the organic peroxide be at least one selected from the group consisting of hydroperoxides, dialkylperoxides, peroxy esters, diacylperoxides, peroxyketals, and ketone peroxides." is amended to "The organic peroxide is at least one selected from the group consisting of hydroperoxides, dialkylperoxides, peroxy esters, diacylperoxides, peroxyketals, and ketone peroxides."

(2) At page 6, lines 3 to 5 of the specification, "In the lithium secondary battery, it is preferred that the organic peroxide account for 0.1 to 5 % by weight of the non-aqueous electrolyte." is amended to "When the organic peroxide is included in the non-aqueous electrolyte, it is preferred that the organic peroxide account for 0.1 to 5 % by weight of the

non-aqueous electrolyte."

R 34  
(3) At page 14, lines 3 to 6 of the specification, "Exemplary organic peroxides include hydroperoxides, dialkylperoxides, peroxy esters, diacylperoxides, peroxyketals, and ketone peroxides. These organic peroxides may be used singly or in combination of two or more of them." is amended to "The organic peroxide includes at least one selected from the group consisting of hydroperoxides, dialkylperoxides, peroxy esters, diacylperoxides, peroxyketals, and ketone peroxides."

(4) In claim 1 of page 42, "and at least one of said positive electrode, said negative electrode, and said non-aqueous electrolyte includes an organic peroxide." is amended to "at least one of said positive electrode, said negative electrode, and said non-aqueous electrolyte includes an organic peroxide, and said organic peroxide is at least one selected from the group consisting of hydroperoxides, dialkylperoxides, peroxy esters, diacylperoxides, peroxyketals, and ketone peroxides."

(5) In claim 3 of pages 42 to 43, "The lithium secondary battery in accordance with claim 1, wherein said organic peroxide is included in said non-aqueous electrolyte." is amended to "The lithium secondary battery in accordance with claim 1, wherein said organic peroxide is included in said non-aqueous electrolyte, and said organic peroxide accounts for 0.1 to 5 % by weight of said non-aqueous electrolyte."

(6) Claims 3 and 4 are deleted.

#### 6 List of Attached Documents

- (1) Pages 5, 6 and 14 of the specification
- (2) Pages 42 to 43 of Claims

and excellent cycle characteristics.

#### Means for Solving the Problem

[0010]

The present invention relates to a lithium secondary battery including: a positive electrode including a positive electrode active material; a negative electrode including a negative electrode active material; and a non-aqueous electrolyte. The positive electrode active material comprises at least one lithium-containing composite oxide represented by the following general formula:  $\text{Li}_x\text{M}^1_{1-y}\text{M}^2_y\text{O}_2$  where  $\text{M}^1$  and  $\text{M}^2$  are different elements,  $\text{M}^1$  is Ni or Co,  $\text{M}^2$  is at least one selected from Ni, Co, Mn, Mg, and Al,  $1 \leq x \leq 1.05$ , and  $0 \leq y \leq 0.7$ . The negative electrode active material comprises at least one selected from the group consisting of silicon, tin, a silicon-containing alloy, and a tin-containing alloy. At least one of the positive electrode, the negative electrode, and the non-aqueous electrolyte includes an organic peroxide.

[0011]

The organic peroxide is at least one selected from the group consisting of hydroperoxides, dialkylperoxides, peroxy esters, diacylperoxides, peroxyketals, and ketone peroxides.

[0012]

In the lithium secondary battery, it is preferred that the organic peroxide be included in the non-aqueous

electrolyte.

[0013]

When the organic peroxide is included in the non-aqueous electrolyte, it is preferred that the organic peroxide account for 0.1 to 5 % by weight of the non-aqueous electrolyte.

[0014]

In the lithium secondary battery, it is preferred that the organic peroxide be included in the negative electrode.

[0015]

In the lithium secondary battery, it is preferred that the negative electrode active material comprise a silicon-containing alloy.

[0016]

In the lithium secondary battery, it is further preferred that the silicon-containing alloy comprise: a solid solution including silicon and at least one transition metal element selected from the group consisting of Ti, Ni, Co, Fe, and Cu; or an alloy including silicon and at least one intermetallic compound selected from the group consisting of  $\text{TiSi}_2$ ,  $\text{TiSi}$ ,  $\text{CoSi}_2$ ,  $\text{CoSi}$ ,  $\text{FeSi}_2$ ,  $\text{FeSi}$ ,  $\text{NiSi}_2$ ,  $\text{NiSi}$ , and  $\text{Cu}_3\text{Si}$ .

[0017]

In the lithium secondary battery, it is further preferred that the intermetallic compound be  $\text{TiSi}_2$ .

Effects of the Invention